

phical headings; 2. Physical Geology, as Phenomena of underground origin, Surface phenomena, and Rock-formation; 3. Applied and Economic Geology; 4. Petrology; 5. Mineralogy; 6. Palaeontology, taking in order the Vertebrates, Invertebrates, and Plants; 7. Maps and Sections; 8. Miscellaneous and General; together with Supplements for 1874-6, a very valuable Index of new Species (rocks, minerals, and fossils), and, lastly, an excellent General Index. The long list of periodicals supplying memoirs and notices, treated of in abstract, occupies 14 pages. Numerous books, of course, are noticed in their respective places according to their subjects. Altogether the year 1876 has evidently produced a fair harvest of geological work; and the 'Record' may be likened to the reaper, binder, stacker, thresher, and winnower of the golden grain of knowledge, enabling some to compile new and valuable accumulations, others to use and digest excellent aliment for their intellectual progress, and others to sow chosen and most promising seed, in well prepared furrows, for the benefit of future students.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

November 6, 1878.—Henry Clifton Sorby, Esq., F.R.S.,
President, in the Chair.

The following communications were read:—

1. "On the Range of the Mammoth in Space and Time." By Prof. W. Boyd Dawkins, M.A., F.R.S., F.G.S.

The author expressed his opinion that the result of the evidence collected since the death of Dr. Falconer has been to establish the view of that palaeontologist as to the Mammoth having appeared in Britain before the Glacial epoch. The evidence as to the occurrence of the Mammoth in the south of England was first examined. The remains found beneath the bed of erratics near Pagham belonged, not to *Elephas primigenius*, but to *E. antiquus*. But in 1858 remains belonging to the former were found by Prof. Prestwich under Boulder-clay in Hertfordshire. In Scotland remains of *E. primigenius* have been found under Boulder-clay; but whether under the oldest Boulder-clay is uncertain. In 1878 a portion of a molar was brought up from a depth of 65 feet near Northwich; it was in a sand beneath Boulder-clay, which the author considered to be undoubtedly the older Boulder-clay. The author now assents to Dr. Falconer's opinion (which he formerly doubted) that *E. primigenius* was a member of the Cromer Forest-bed fauna. It is also clear that it was living in the southern and central parts of England in Postglacial times. It has not been found north of Yorkshire on the east, and Holyhead on the west, probably because Scotland and North-west England were long occupied by glaciers. Its remains have

been found on the continent as far south as Naples and as far north as Hamburg, but not in Scandinavia. Its remains, as is well known, abound in Siberia, and it ranged over North America from Eschscholtz Bay to the Isthmus of Darien, *E. columbi*, *E. americanus*, and *E. Jacksoni* being only varieties. The author then discussed the relations of *E. primigenius* to *E. columbi*, *E. armeniacus*, and *E. indicus*, and came to the conclusion that it was the ancestor of the last.

2. "The Mammoth in Siberia." By H. H. Howorth, Esq., F.S.A. Communicated by J. Evans, Esq., LL.D., F.R.S., V.P.G.S.

The author gave reasons for considering that the "griffon's claw" sent by Harun-al-Rashed to Charlemagne was the horn of a fossil Rhinoceros, so that the extinct mammals coeval with the Mammoth were known in Europe at an early date. They were probably known even in the days of Herodotus. Other evidence, such as the Christy Collection, shows that the Siberian deposits were known at a very early time. There is evidence, too, to show that fossil ivory was known to the Chinese, who asserted that the animals were still living underground. The author described several cases of the discovery of well-preserved bodies of Mammoths in historic times. They have occurred in widely separated places, from the eastern watershed of the Obi to the peninsula of the Tschuksi. Bones also have been found over the whole length of Siberia, the Brai Islands, and the islands of New Siberia.

The author further discussed the theories which account for their presence:—1. That the animals lived much further south, and were carried down by rivers to where they now lie; 2. That they lived on the spot. As there are physical difficulties in the way of the transport theory, as the Mammoth was covered with dense hair and fed on plants growing on the spot, and as the remains are not confined to the vicinity of rivers, it is probable that the second view is the correct one.

There are, however, some points connected with it requiring further consideration. It being proved that the Mammoth only required a temperate climate, it must not be hastily assumed that it could endure that of Siberia. Where the Mammoths are now found the ground at 2 or 3 feet below the surface is permanently frozen all the year round, vegetation does not appear till June and is very poor and stunted, the summer is very short, the winter proportionately long, the temperature in January is as low as -65° F., and no tree will now grow in the greater part of North Siberia. How then could *Elephas primigenius* and *Rhinoceros tichorhinus* obtain food on such ground? The only alternative seems to be, either to suppose a great migration N. and S., or a change of climate. The author is of opinion that in Siberia such a migration is not possible. It seems therefore more probable that the climate of Siberia has become more severe. The plants found in the fissures of the Rhinoceros-teeth are those now living in South Siberia. The plant-remains associated with the Mammoth (not floated from a distance, but of

the locality) show the same thing, larch, birch, and other trees of good size being found. Freshwater and land shells are also found, not now living. Hence it seems reasonable to conclude that the climate has become more severe, and that of the north in the days of the Mammoth resembled that of the south at the present time. The author then considered the cause of the Mammoth's extinction. This he held to have been sudden. The remains must have been preserved soon after death. He therefore maintains that they were destroyed by a flood due to some sudden convulsion which also changed the climate.

3. "On the Association of Dwarf Crocodiles (*Nannosuchus* and *Theriosuchus pusillus*, e. g.) with the diminutive Mammals of the Purbeck Series. By Prof. R. Owen, C.B., F.R.S., F.G.S.

The author noticed an objection which had been raised to his view of the origin of the differences between the Mesozoic and Neozoic Crocodiles by the adaptation of the latter to the destruction by drowning of large mammalia (Q. J. G. S. xxxiv. p. 422), namely that mammals were coexistent with the Mesozoic forms, and remarked that from their small size they would hardly constitute a suitable prey for the Crocodiles to which he then specially referred, but would be more likely to perform the same part as the Ichneumons of the present day, which check the increase of Crocodiles by destroying their eggs and newly-hatched young. He stated, however, that in waste slabs of "feather-bed" marl which accompanied the Becklesian Purbeck Collection to the British Museum, the remains of small Crocodiles were detected in considerable abundance; and he gave a description of these, and especially of one which he named *Theriosuchus pusillus*. This reptile, which is estimated to have been about 18 inches long, had scutes presenting the "peg and groove" character of those of *Goniopholis*, with which genus it further agreed by having the antorbital part of the skull of the broad-faced Alligator type. In the dentition it resembled the Triassic Theriodonts more than any other Crocodiles. The vertebrae are amphiplatyan. In conclusion, the author indicated the conditions which have to be fulfilled in the case of recent Crocodiles to enable them to drown a large mammal without inconvenience to themselves, and showed that these conditions were realized also in the Neozoic forms, whilst there was no reason to suppose that any Mesozoic Crocodiles possessed the adaptations in question.

November 20, 1878.—R. Etheridge, Esq., F.R.S.,
Vice-President, in the Chair.

The following communications were read:—

1. "On the Upper-Greensand Coral Fauna of Haldon, Devonshire." By Prof. P. Martin Duncan, M.B. Lond., F.R.S., F.G.S., &c.

The author in this paper stated that since the publication of his

supplement to the British Fossil Corals, published by the Palæontographical Society, several new corals have been obtained at Haldon by Mr. Vicary, of Exeter. Twelve additional species were noticed, of which ten were new. This brings the total number of species in the Haldon Greensand up to twenty-one. The new species are thus distributed:—*Aporosa*: *Oculinidæ* (1), *Astræidæ* (3), *Fungidæ* (5); *Perforata*, *Turbinariæ* (2); *Tabulata* (1). The paper concluded with remarks on the genera and species represented, from which it appeared that the Coral fauna of Haldon is the northern expression of that of the French and Central European deposits, which are the equivalents of the British Upper Greensand. The Haldon deposit was formed in shallow water, and the corals grew upon the rolled débris of the age.

2. "Notes on *Pleurodon affinis*, sp. ined., Agassiz, and Description of three Spines of Cestracionts from the Lower Coal-measures." By J. W. Davis, Esq., F.G.S.

The author described some fossil remains of fish obtained from the bone-bed immediately above the "Better-bed Coal" referred to by him in a former paper (see Q. J. G. S. vol. xxxii. p. 332). The fossils described included *Ichthyodorulites* belonging to 4 species, namely:—*Pleurodon affinis*, a species named, but not described or figured by Agassiz; *Hoplonchus elegans*, gen. et sp. nov.; *Ctenacanthus æquistriatus*, sp. nov.; and *Phricacanthus biserialis*, gen. et sp. nov. Teeth believed to be those of *Pleurodon affinis* were also described.

MISCELLANEOUS.

Diastylis bimarginatus.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,—When Mr. Sim sent me the specimen of *Diastylis bimarginatus* it was accompanied with his own drawing, which is similar to that which you have published in the last number of the 'Annals.' It was because I had the opportunity of comparing it with the animal that I preferred making the sketch I sent to you. Had I received the animal in an unmutilated condition I could have entered into more minute detail.

Yours faithfully,

Plymouth, Dec. 22, 1878.

C. SPENCE BATE.

Germination of the Spores of Volvox dioicus. By M. HENNEGUY.

Two years ago I communicated to the Academy of Sciences a note on the subject of the reproduction of *Volvox dioicus*, Cohn, in which I indicated the gradual appearance of sexuality in these organisms,